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## A HERPETOFAUNAL SURVEY OF THE COASTAL ZONE OF NORTHWEST OHIO

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### Abstract

A survey of the herpetofauna of the coastal zone of northwest Ohio was conducted from mid-June through late August, 1980. Emphasis was placed on the collection of locality and population size data for *Emydoidea blandingi*, *Thamnophis sirtalis* (melanistic), *Nerodia sipedon insularum*, and *Elaphe vulpina*. Data were recorded, however, for all herpetofaunal species encountered. Localities within the coastal zone are listed for all reptiles and amphibians seen during the survey. We present our opinions of the present status of the herpetofauna within the coastal zone as well as natural history notes where useful. Several new county records are recorded as well as range extensions. The distribution of the melanistic phase of *Thamnophis sirtalis* within the state is detailed for the first time.

### Introduction

The coastal zone of the northwest Ohio end of Lake Erie is of biological interest because it supports the most extensive tracts of marshland in the state. The botanical and ornithological significance of the region is evident, but perhaps less obvious is the fact that this area contains a unique herpetofauna, certain elements of which are rare or lacking in the remainder of the state.

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The marshes are concentrated between Toledo and the eastern end of Sandusky Bay. To the east of this, the marshes become associated mainly with rivers until at approximately the border of Erie and Lorain Counties they become nonexistent and are replaced by a woodland flora more characteristic of northeast Ohio. Here the coastal zone becomes but a thin strip of land for the remainder of its length east to Pennsylvania. Due to extensive development of the narrow coastal zone east of Erie County, coastal habitat in northwest Ohio suitable for supporting a large herpetofauna effectively terminates at the eastern end of Erie County.

Because this region is unique and is undergoing increasing habitat destruction, the Division of Natural Areas and Preserves of the Ohio Department of Natural Resources initiated in 1980, as part of the Ohio Coastal Zone Management Program, several studies dealing with the flora and fauna of the region. Although the herpetological survey was principally concerned with determining the localities in the region of several taxa actually or potentially endangered in the state, data were recorded for all species encountered. The data gathered during the ten weeks of the survey (June–August, 1980) comprise the core of the present report but, when useful, additional notes gathered by us over the past several years are used to supplement these data.

The reptiles and amphibians of the coastal zone, though not specifically dealt with, have been previously included in the works of Conant (1938a, 1951) and Walker (1946). The herpetofauna of the Lake Erie Islands has been well-covered by Langlois (1964). No report, however, has appeared dealing specifically with the herpetofauna of the marshland as a unit. This information would be especially useful because the region has undergone much change since the time of Conant and Walker. The purpose of this report is to provide baseline information on the present-day status and geographic distributions of the species comprising the coastal zone herpetofauna.

### Materials and Methods

The geographical scope of the study area is largely confined to within the politically defined boundary of the Ohio Coastal Zone in Lucas, Ottawa, Sandusky, Erie, and extreme western Lorain Counties (Fig. 1). This includes all islands in western Lake Erie under Ohio jurisdiction. Moreover, records, when available, are given for localities in close proximity to this politically defined unit because of the ecological focus of this report.

Surveying consisted primarily of walking along trails, dikes, or through

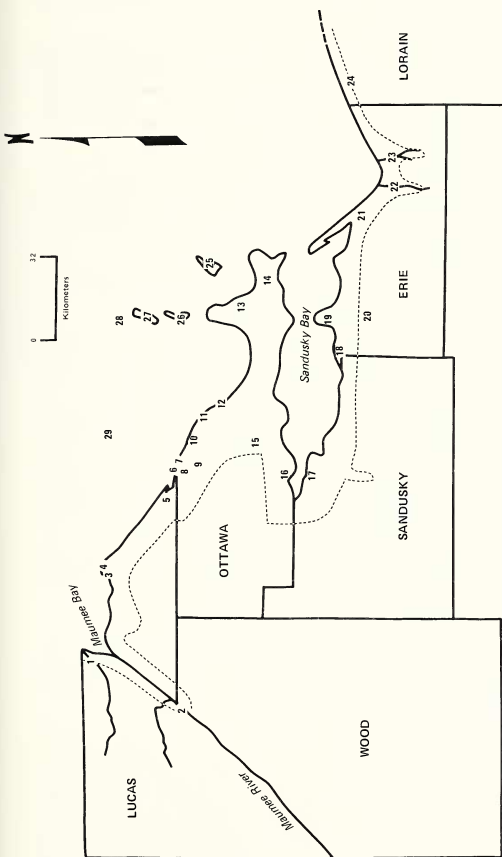


Fig. 1. Collecting sites in Lucas, Ottawa, Sandusky, Erie, and Lorain Counties, Ohio visited during the 1980 ODNR herpetofauna survey. 1—Ottawa River, Toledo; 2—Maumee River Islands; 3—Nile's Woods; 4—Cedar Point NWR; 5—Metzger's Marsh; 6—Crane Creek SP; 7—Magee Marsh; 8—Ottawa NWR; 9—Toussaint Creek WA; 10—Navarre Marsh; 11—Toussaint Shooting Club; 12—Darby Marsh; 13—East Harbor SP; 14—Marblehead Quarries; 15—Little Portage River WA; 16—Winous Point; 17—Ottawa Shooting Club; 18—Willow Point WA; 19—Bayview Marsh; 20—Resthaven WA; 21—Sheldon's Marsh; 22—Huron River; 23—Old Woman's Creek; 24—High Bridge Rd.; 25—Kelleys Island; 26—South Bass Island; 27—Middle Bass Island; 28—North Bass Island; 29—West Sister Island. The area within the dashed line is the coastal zone of Lake Erie in northwest Ohio.

woods, noting the time of each capture or positive identification of a species. Wading along shores or surveying from a canoe was occasionally employed. Cover, when present, was overturned to locate secretive species. Binoculars were often used to observe turtles. Bullfrogs (*Rana catesbeiana*) were often identified by their calls.

When a specimen was captured, its sex and length were noted. Total length was usually estimated to the nearest one inch for lizards and salamanders, two inches for small snakes, and six inches for large snakes. Total length was not generally estimated for turtles. When in the text length is given in metric units, it indicates exact length to the nearest millimeter.

Most specimens captured were released unharmed at the point of capture after the pertinent information was recorded. Specimens from non-protected areas, however, were occasionally preserved for future study or as locality records.

Observations were made throughout the day for many areas, allowing for collection of data on the diel activity of the more abundant species.

In the following, all species captured during the survey are listed (vernacular and scientific names are in accordance with Collins et al., 1982). The localities, dates, and numbers observed are given for each species. Some of the records listed were not observed directly by us but by other sources we considered reputable. Such instances are noted in the species accounts.

If information is available for a species from an area adjacent to the politically defined coastal zone, it is included. (Henceforth, the term "coastal zone" is used interchangeably with "marsh zone" and is intended to denote the more broad ecological and physiographic definition of the region rather than the political definition.)

Included for each species is our impression of its status within the coastal zone. The status is listed as follows:

*Abundant*—common at numerous localities

*Common*—present at many localities, density may vary between localities

*Uncommon*—present at some localities, often restricted in habitat or density; or secretive, and may be present at many localities

*Rare*—very restricted in range and numbers

Remarks follow for each species, which may include natural history notes and comments on factors leading to the species' status in the coastal zone. Additionally, for species which in Ohio are largely or entirely endemic to the coastal zone (and, therefore, endangered or potentially threatened), we offer suggestions we believe may be effective in reversing the decline of the species' populations or in assuring their continuance within the state.

Following the discussion section of each species is a list of localities

within the coastal zone where we did not locate the species but where previous authors have recorded the species.

### Description of the Collecting Sites

The western Ohio portion of the Lake Erie coastal zone is composed primarily of marshland with scattered small woods on areas of higher ground. The marshes consist of large expanses of shallow water that locally may form mud flats during the warmer part of the year. Vegetation in these shallow waters consists mainly of emergents. Characteristic are the Nymphaeaceae, *Typha*, *Alisma*, *Sagittaria*, and *Potamogeton*, with *Typha* predominating. In areas of deeper water, vascular plants may be lacking altogether. The marshes are transected by numerous dikes which characteristically support a terrestrial early successional stage flora. Characteristic plants include the Cyperaceae, Gramineae, *Cirsium*, *Asclepias*, *Plantago*, *Urtica*, *Ambrosia*, *Taraxacum*, and *Daucus*. These dikes are usually earthen, but often overlie a base of limestone boulders which, along the sides of the dikes, provide excellent habitat for certain snake species. Most of the specimens discussed here were found on or adjacent to dikes in the marshes.

On higher ground in some of the marshes small tracts of woods occur, but these are largely unsuitable for habitation by reptiles and few specimens were captured in them. The soil is usually waterlogged and standing water is often present.

Within the coastal zone and distinct from the marshland are the limestone islands north of the Catawba Peninsula, and similar limestone areas on the Marblehead Peninsula of the mainland. The primary habitats on the islands are the rock-strewn shores and inland fields and woods. Additionally, the quarries on Kelleys Island and the Marblehead Peninsula have field and rock ledge habitats unique within the coastal zone.

On the mainland are rocky shores and narrow beach strands. The former is composed primarily of artificial dikes. Beach strand was the predominant form of natural shoreline in the past but is fast disappearing due to action by the lake. In the following the term "shore" indicates a rocky coastal habitat, while "beach" denotes a sandy one.

Within the coastal zone most tracts of land large enough to be of significance in supporting large reptile and amphibian populations are owned by the federal or state governments or by private hunting clubs. Otherwise, most of the remaining land in the coastal zone does not consist of sufficiently large tracts of suitable habitat and was not visited in this survey.

The localities studied, their acreage, and major habitats follow. Locations are shown in Figure 1. The Ottawa National Wildlife Refuge is composed

of five units which shall be referred to separately; "Ottawa NWR" designates the largest unit wherein is located the refuge headquarters. Abbreviations used are NWR for National Wildlife Refuge, SP for State Park, and WA for Wildlife Area.

- (1) Ottawa River, Toledo, Lucas Co. (80)—fields, riverine cattail marsh
- (2) Maumee River islands, Lucas Co. (200)—woods, riverine marsh
- (3) Nile's Woods, Lucas Co. (1241)—shore, fields, cattail marsh, woods
- (4) Cedar Point NWR, Lucas Co. (2245)—marsh, woods, beach
- (5) Metzger's Marsh, Lucas Co. (558)—shore
- (6) Crane Creek SP, Lucas and Ottawa Cos. (72)—marsh, beach, woods
- (7) Magee Marsh, Ottawa Co. (2131)—marsh, beach, woods
- (8) Ottawa NWR, Lucas and Ottawa Cos. (4683)—marsh, shore, woods, beach
- (9) Toussaint Creek WA, Ottawa Co. (236)—marsh
- (10) Navarre Marsh, Ottawa Co. (591)—marsh, beach, woods
- (11) Toussaint Shooting Club, Ottawa Co. (1800)—marsh, beach
- (12) Darby Marsh, Ottawa Co. (520)—marsh, shore
- (13) East Harbor SP, Ottawa Co. (1691)—beach, marsh, woods
- (14) Marblehead Quarries, Ottawa Co. (2500)—limestone outcrops and fields
- (15) Little Portage River WA, Ottawa Co. (357)—marsh
- (16) Winous Point, Ottawa Co. (4500)—marsh, shore, woods
- (17) Ottawa Shooting Club, Sandusky Co. (3500)—marsh, woods
- (18) Willow Point WA, Erie Co. (645)—marsh, shore, woods
- (19) Bay View Marsh, Erie Co. (1175)—marsh
- (20) Resthaven WA, Erie Co. (2210)—woods, fields
- (21) Sheldon's Marsh, Erie Co. (386)—marsh, beach, woods
- (22) Huron River, Erie Co. (500)—fields, riverine marsh, and woods
- (23) Old Woman's Creek, Erie Co. (640)—fields, riverine marsh, and woods
- (24) High Bridge Rd., Lorain Co. (80)—woods, fields
- (25) Kelleys Island, Erie Co. (2797)—limestone outcrops, fields, woods
- (26) South Bass Island, Ottawa Co. (1570)—shore, fields, woods
- (27) Middle Bass Island, Ottawa Co. (813)—shore, fields, woods
- (28) North Bass Island, Ottawa Co. (704)—shore, fields, woods
- (29) West Sister Island, Lucas Co. (80)—shore, woods

## Species Accounts

*Ambystoma tigrinum tigrinum* (Eastern Tiger Salamander)

Kelleys Island, 8-19-80 (1), 7-23-81 (6).

Rare

The 1980 specimen was captured under a piece of wet cardboard in short grass near the quarry at the center of the island; all others were found in or adjacent to rock slides. We are aware of other recent specimens from the island and Langlois (1964) records them from South Bass Island and Middle Bass Island.

*Ambystoma maculatum* (Spotted Salamander)

High Bridge Rd., Lorain Co., 7-23-80 (6).

Rare

Located in late morning under railroad ties adjacent to a mesic woods. All specimens were adults.

Recorded from South Bass Island by Langlois (1964).

*Ambystoma texanum* (Smallmouth Salamander)

Ottawa River, Toledo, 4-11-80 (1); Middle Bass Island, 6-8-80 (1). Rare

The first specimen was found along a ditch, the second along the east shore of Middle Bass Island. This species occurs primarily in populations composed largely of hybrids between this species and *A. laterale*.

Downs (1978) records this species as relatively rare on Middle Bass Island. Other literature records are questionable due to the tendency for this species to form hybrids in this region and the difficulty of separating *A. texanum* from the hybrids.

*Ambystoma* hybrids

Ottawa River, Toledo, 3-20-80 (1); Pearson Park, 5-9-80 (5); East Harbor SP, 6-26-80 (2), 8-14-80 (8); Sheldon's Marsh, 7-15-80 (1); High Bridge Rd., Lorain Co., 7-23-80 (1), 6-28-81 (1); Kelleys Island, 8-19-80 (3); Middle Bass Island, 6-7-80 (2).

Uncommon

These are hybrids between *A. texanum* and *A. laterale* (see Downs, 1978) and, on Kelleys Island, between *A. texanum* and *A. tigrinum*. Furthermore, the Lorain Co. specimens may be hybrids between *A. texanum* and *A. jeffersonianum* as Uzzell (1964) records *A. jeffersonianum* from within a couple miles of this site.

The Pearson Park locality is 3 mi. east of the Toledo city boundary.

All specimens were found in mesic conditions, often in or adjacent to woods that were subject to flooding. Though not easily located, these salamanders probably have a more extensive range within the coastal zone than presently indicated. However, their distribution will no doubt prove to be discontinuous due to the isolated occurrence of their wooded habitat throughout much of the marsh zone.

Downs (1978) also records these salamanders from Middle Bass Island and North Bass Island.

*Plethodon cinereus* (Redbacked Salamander)

East Harbor SP, 6-26-80 (1); Sheldon's Marsh, 8-22-80 (2); High Bridge Rd., Lorain Co., 7-23-80 (5).

*Uncommon*

All specimens were found in mesic situations in or adjacent to woods. The species was only recorded from the eastern half of the study zone, where somewhat higher elevations occur and woodlands are more prevalent.

This species has been recorded from South Bass Island (Langlois 1964).

*Plethodon glutinosus glutinosus* (Slimy Salamander)

Old Woman's Creek, 7-8-80 (1).

*Rare*

One specimen was found under a log on a dry westward-facing hillside, adjacent to the river. The specimen measured 74 mm S-V length and was a female. This probably represents the westward-most extension of the species in northern Ohio.

*Bufo americanus americanus* (Eastern American Toad)

Ottawa River, Toledo, 6-19-80 (1); East Harbor SP, 7-7-80 (1); Marblehead Quarries, 8-14-80 (>20); Winous Point, 7-25-80 (1); Ottawa Shooting Club, 8-4-80 (3); Willow Point WA, 8-12-80 (1); Resthaven WA, 8-1-80 (1); Castalia, 8-13-80 (1); Sheldon's Marsh, 8-22-80 (3); Huron River, 8-8-80 (2); Old Woman's Creek, 7-9-80 (2); High Bridge Rd., Lorain Co., 7-23-80 (4); Kelleys Island, 8-19-80 (6). *Uncommon*

Although this species was found at several localities in the coastal zone, it appeared common at only two localities. Fields, beaches, and woods were occupied, though quarry fields produced the most individuals.

The Ottawa Shooting Club locality represents a new county record for the species.

It has previously been found in the coastal zone at Port Clinton,



Ottawa Co.; and on Gibraltar Island, Middle Bass Island, and South Bass Island (Walker 1946).

*Bufo woodhousei fowleri* (Fowler's Toad)

Crane Creek SP, 6-17-80 (1); East Harbor SP, 6-26-80 (2), 7-7-80 (1); Old Woman's Creek, 7-9-80 (2).

Rare

This species was not commonly seen during the survey. The specimens at the first two localities were on beaches; the last locality was a field.

The species has previously been recorded in the coastal zone near Castalia and at Cedar Point, Erie Co.; and at Port Clinton and on the Marblehead Peninsula, Ottawa Co. (Walker 1946).

*Acris crepitans blanchardi* (Blanchard's Cricket Frog)

Ottawa Shooting Club, 8-12-80 (3); Middle Bass Island, 7-25-80 (1).

Rare

The specimens at the first locality were on a grassy dike adjacent to marshland; the one from the second locality was in a woodland pond.

Previously recorded from Castalia and Sandusky, Erie Co.; and North Bass Island by Walker (1946).

*Rana catesbeiana* (Bullfrog)

Cedar Point NWR, 6-23-80 (3), 7-14-80 (1); Ottawa NWR, 6-20-80 (1); Crane Creek SP, 6-17-80 (1); Magee Marsh, 4-27-74 (2); Toussaint Creek WA, 6-30-80 (3), 8-13-80 (1), 5-16-80 (1); Navarre Marsh, 6-27-80 (1); Darby Marsh, 7-1-80 (1); Old Woman's Creek, 7-8-80 (2); Middle Bass Island, 7-3-80 (1), 7-25-80 (1).

Common

This species is a characteristic denizen of the marshes in the coastal zone and is doubtless more widespread and abundant than indicated by our data. Due to the species' habit of frequenting offshore areas, most of the above records are counts of calling individuals.

The Old Woman's Creek locality may represent a new county record for the species.

The bullfrog has been previously recorded in Ottawa Co. at Camp Perry, Lakeside, East Harbor, and South Bass Island by Walker (1946) and Gibraltar Island by Langlois (1964).

*Rana clamitans melanota* (Green Frog)

Toussaint Creek WA, 8-20-80 (1); Navarre Marsh, 6-27-80 (1);

Marblehead Quarries, 8-14-80 (1); Ottawa Shooting Club, 6-6-81 (1); High Bridge Rd., Lorain Co., 7-23-80 (1), 6-28-81 (2). *Uncommon*

The apparent rarity of this species in the coastal zone may be actual or an artifact of our sampling methods in the habitat occupied by the species in this area. If, like the bullfrog, it inhabits primarily deeper water in the marshes, the species may be common yet remain unnoticed. Walker (1946) records the species as absent from the coastal zone except for Townsend Twp., Sandusky Co. and an old record from Castalia, Erie Co. by Morse (1904). The Toussaint Creek, Navarre Marsh, and Marblehead Quarries records represent the first definite locality records for Ottawa Co. The first two localities are marsh, the third field and limestone outcrop, and the fourth woods.

*Rana pipiens* (Northern Leopard Frog)

Ottawa River, Toledo, 6-19-80 (1), 7-19-81 (>20); Cedar Point NWR, 6-23-80 (1), 7-9-80 (1), 7-14-80 (4); Ottawa NWR, 6-20-80 (1), 6-24-80 (1); Crane Creek SP, 6-17-80 (2); Magee Marsh, 6-16-80 (5), 6-18-80 (2); Toussaint Creek WA, 8-13-80 (>20), 8-20-80 (>80); Navarre Marsh, 6-25-80 (1); Darby Marsh, 7-1-80 (2); East Harbor SP, 6-26-80 (3); Little Portage River WA, 7-18-80 (5), 8-11-80 (>20); Winous Point, 7-25-80 (>50), 8-21-80 (>50); Ottawa Shooting Club, 8-12-80 (>20); Willow Point WA, 7-30-80 (1); Bay View Marsh, 7-24-80 (>30); High Bridge Rd., Lorain Co., 6-28-81 (1); Kelleys Island, 8-19-80 (1). *Abundant*

This is at times an incredibly abundant frog in the marshes; at other times it may appear rare or absent. It occurs most commonly in areas of high grass and is most frequently found on the dikes during very hot weather. Under such prime conditions frogs may occur every few feet. The species is characteristic of the marsh zone and a very important link in the trophic structure of the marsh community.

At Winous Point on 8-21-80 several of these frogs were heard giving distress calls in the grass. Investigation invariably determined the caller to be in the process of being swallowed by *Thamnophis sirtalis*. Since our investigation into the matter several times caused the snakes to release their prey, the utility of the distress call is obvious. It would be interesting if the distress call served the same purpose naturally, by attracting other species to the disturbance to effect release of the prey.

Additionally, the species has been reported from Cedar Point,

Erie Co.; the Marblehead Peninsula, and South Bass, Middle Bass, North Bass, and West Sister Islands by Walker (1946).

*Rana sylvatica* (Wood Frog)

High Bridge Rd., Lorain Co., 7-23-80 (5).

Rare

This species appears totally absent from the marsh areas, although Morse (1904) recorded it as present at Sandusky, Erie Co. The above specimens were found in a wooded situation within the coastal zone but east of the extensive zone of marshland.

*Chelydra serpentina serpentina* (Common Snapping Turtle)

Cedar Point NWR, 6-30-80 (1); Metzger's Marsh, 5-29-81 (1); Magee Marsh, 6-16-80 (1); East Harbor SP; Winous Point; Ottawa Shooting Club, 8-4-80 (1); Willow Point WA, 7-30-80 (1), 5-16-81 (1).

Common

We list the status of this species in the marsh zone as common, despite the few records available, because of its secretive, highly aquatic habits. These turtles characteristically lie submerged on the marsh substrate except when surfacing for air or, very rarely, sunning. Of the above records, three were sightings of dead animals, two of surfacing animals, and one of a basking animal. The Winous Point locality is based on the experience of manager Dr. Bob Meeks, who often captures the species in traps. Similarly, the East Harbor locality is based on a specimen captured there by park personnel and observed by us. Because this species frequents both marshes and ditches we have no doubt that it ranges widely throughout the coastal zone, despite the difficulty of its detection without the use of traps.

The Ottawa Shooting Club specimen represents a new county record.

The species has previously been recorded in the coastal zone at Sandusky, Erie Co.; Erie Twp., and South Bass Island, Ottawa Co.; and Bono, Lucas Co. (Conant 1938a).

*Emydoidea blandingi* (Blanding's Turtle)

Nile's Woods, 6-18-80 (4); Cedar Point NWR, 6-23-80 (2), 7-9-80 (1), 7-14-80 (1); Ottawa NWR, 6-20-80 (5); Crane Creek SP, 6-17-80 (3); Magee Marsh, 6-16-80 (3); Navarre Marsh, 6-25-80 (2), 6-27-80 (2); Toussaint Shooting Club, 7-28-80 (8), 7-29-80 (1); Darby Marsh, 7-1-80 (1); East Harbor SP, 7-7-80 (3); Winous Point; Ottawa Shooting Club,

8-4-80 (5); Willow Point WA, 8-12-80 (1); Old Woman's Creek, 7-8-80 (1); Middle Bass Island, 6-8-80 (1).

*Common*

Due to this species' restricted geographic range in Ohio, this was one of the species of interest to the ODNR during the reptile survey. This species, like *Chelydra*, is mainly aquatic and basks infrequently. For this reason the species may be common in an area, yet go unnoticed. This is exemplified at Winous Point where we located no specimens although they have been frequently captured in turtle traps by manager Dr. Bob Meeks. Similarly, at the Toussaint Shooting Club, only one of the nine specimens was a sight record; the other eight were accidentally captured in fish nets maintained by club members and would have been overlooked by us otherwise. Additionally, the East Harbor SP locality record is based on specimens captured by park personnel and retained in captivity there for the summer.

Our records seem to indicate that when this species basks, it is more or less constant throughout the day from 1000 h to 1800 h, with no apparent peak of activity. Only one specimen was observed before 1000 h. Basking is usually done on logs, but some specimens were observed to bask by floating on the surface of the water.

Three females were captured on land. One was making a nest on 7-14-80. The other two were captured on 6-18-80 and 7-1-80, presumably in some stage of the egg-laying process.

Hatchlings and juveniles were never seen by us. All specimens were large adults or ca. 6-in. subadults. Possibly juveniles are rare or totally aquatic, though we may have overlooked basking individuals. We consider the latter unlikely since small *Chrysemys* were easily spotted under such conditions.

Because this species is aquatic, lacks commercial value, and occupies protected lands, it will likely not suffer drastic population declines in the marsh zone of Ohio.

This species has been recorded from Cedar Point and Sandusky, Erie Co.; Green Island, Ottawa Co.; and Bono, Lucas Co. by Conant (1938a) and on North Bass Island and South Bass Island by Langlois (1964).

#### *Chrysemys picta marginata* (Midland Painted Turtle)

Ottawa River, Toledo, 6-19-80 (1); Maumee River Islands, 8-7-80 (1); Nile's Woods, 8-11-80 (1); Cedar Point NWR, 6-23-80 (13), 7-14-80 (3); Metzger's Marsh, 6-18-80 (1); Ottawa NWR, 6-20-80 (27), 6-24-80 (10), 5-29-81 (2); Crane Creek SP, 6-17-80 (42); Magee Marsh, 6-16-80

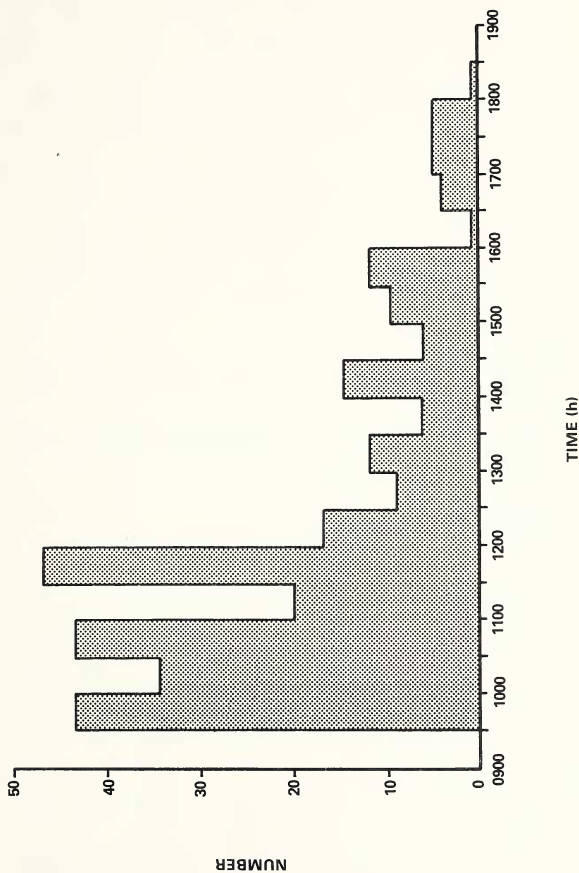


Fig. 2. Basking activity of *Chrysemys picta marginata*.

(12), 6-18-80 (2); Toussaint Creek WA, 6-30-80 (2), 8-13-80 (35); Navarre Marsh, 6-25-80 (16), 6-27-80 (16); Toussaint Shooting Club, 7-28-80 (1), 7-29-80 (1); Darby Marsh, 7-1-80 (12); East Harbor SP, 6-26-80 (2), 7-7-80 (4); Little Portage River WA, 7-18-80 (5); Winous Point, 7-25-80 (6), 8-21-80 (44); Ottawa Shooting Club, 8-4-80 (14), 8-12-80 (3); Willow Point WA, 7-30-80 (3); Resthaven WA, 6-6-80 (1); Bay View Marsh, 7-24-80 (1), 8-4-80 (1); Sheldon's Marsh, 7-15-80 (4); Old Woman's Creek, 7-8-80 (6); Middle Bass Island, 7-3-80 (2), 7-25-80 (6).

*Abundant*

This is one of the most common reptiles of the marsh zone. It was seen basking on any day with full sun. Our data (Fig. 2) indicate a peak in basking activity between 0930 h to 1200 h, with lowered but fairly constant activity between 1200 h to 1600 h, and a decline after 1600 h. Basking individuals were never seen before 0930 h. We feel this is not an artifact of collecting, due to our usual presence in the field before that time.

Two females were observed laying eggs, one each on 6-18-80 and 6-25-80, and three females were making nests, one on 6-16-80 and two on 5-29-81.

Additional localities include South Bass Island (Langlois 1964) and North Bass Island (Conant 1938a).

#### *Graptemys geographica* (Map Turtle)

Nile's Woods, 8-11-80 (1); Winous Point; Old Woman's Creek, 7-8-80 (2).

*Rare*

Albeit our records indicate the map turtle to be rare in the coastal zone, this may be due to the species' shyness, and we assume it to be actually somewhat more abundant than it presently appears. This assumption is reinforced by data from Conant (1938a) which indicate the species to be more widespread in the coastal zone than our observations do. Its apparent rarity is due to the fact that it often frequents deep water and readily takes alarm at disturbances.

The Nile's Woods specimen was seen in a large ditch adjacent to marshland. The Old Woman's Creek specimens were found in a river. At Winous Point, the species frequents marshland and has been observed there by manager Dr. Bob Meeks.

Conant (1938a) records the species from Sandusky and Sandusky Bay, Erie Co.; the mouth of the Sandusky River, Sandusky Co.; the Toussaint River, Port Clinton, the Catawba Peninsula, and South Bass Island, Ottawa Co.; and Bono, Lucas Co.

*Trionyx spiniferus spiniferus* (Eastern Spiny Softshelled)

Winous Point; Huron River, 8-5-80 (1).

Rare

The Huron River specimen was a juvenile found basking on a log next to a dense thicket of emergents in a still, shallow section of the river. This species is largely an inhabitant of rivers and was not observed by us in marsh situations. Dr. Meeks has seen one specimen collected at the mouth of the Sandusky River, Winous Point.

The species was previously recorded in the coastal zone at Sandusky, Erie Co.; East Harbor, Ottawa Co.; and Reno Beach, Lucas Co. by Conant (1938a). It remains unrecorded from the Lake Erie Islands.

*Eumeces fasciatus* (Five-Lined Skink)

Crane Creek SP, 8-31-69 (1), 9-14-69 (1), 9-28-69 (1); Navarre Marsh, 6-25-80 (2), 6-27-80 (7); Castalia, 8-13-80 (5), 6-6-81 (1); Resthaven WA, 8-1-80 (2).

Rare

This species is quite rare in the marsh zone, in part because of its predilection for wooded environs. We have not seen this species at Crane Creek SP in over a decade, although we have received reliable reports of its continued persistence there. A population at adjacent Magee Marsh appears to have been extirpated by human activity roughly ten years ago. Another reason for the disappearance of this species in the marsh zone is the recent destruction by the lake of beach strand woods, its favored habitat in this area. Specimens were found in this habitat at Navarre Marsh and previously at Crane Creek SP (the Crane Creek SP beach strand woods are now eliminated).

The Navarre Marsh locality represents a new county record. The species has been found in the coastal zone previously at Reno, Lucas Co. (Conant 1938a) and near Vickery, Sandusky Co. (Britt 1957).

*Nerodia sipedon sipedon* (Northern Water Snake)

Nile's Woods, 7-4-80 (4); Cedar Point NWR, 6-23-80 (1), 7-9-80 (4), 7-14-80 (3); Metzger's Marsh, 5-19-81 (4); Ottawa NWR, 6-20-80 (18), 6-24-80 (8); Crane Creek SP, 5-24-69 (2); Magee Marsh, 6-16-80 (3), 6-18-80 (2); Toussaint Creek WA, 6-30-80 (1), 8-13-80 (1), 8-20-80 (1), 5-16-80 (7); Navarre Marsh, 6-25-80 (1), 6-27-80 (1); Toussaint Shooting Club, 7-28-80 (16), 7-29-80 (10), 8-3-80 (19); Darby Marsh, 7-1-80 (4); East Harbor SP, 7-7-80 (1); Marblehead Quarries, 8-14-80 (1); Marblehead Peninsula, 4-27-74 (1); Little Portage River WA, 8-1-80 (3), 5-16-81 (6); Winous Point, 7-25-80 (2); Ottawa Shooting Club, 8-12-80 (1); Willow Point WA, 7-30-80 (5), 5-16-81 (16); Bay View

Marsh, 7-24-80 (3), 8-4-80 (1); Resthaven WA, 8-1-80 (1); Sheldon's Marsh, 7-15-80 (1); Huron River, 8-5-80 (7); Old Woman's Creek, 7-8-80 (3), 7-9-80 (5); Middle Bass Island, 6-24-79 (3), 7-28-79 (3), 7-3-80 (2); North Bass Island, 7-11-80 (1).

*Abundant*

*Nerodia sipedon* has two subspecies found in the coastal zone, the nominate form and *N. s. insularum*, which follows. This subspecies is quite abundant on the mainland and is less abundant on the Lake Erie Islands. It is only rarely found far from water, and in the marsh zone a favorite habitat, when available, is the boulder piles projecting from the sides of numerous dikes. They also often bask next to the water on the grassy sides of the dikes or on overhanging branches and brush piles.

Our records indicate that specimens may be found in low numbers throughout the day but their numbers increase between 1100 and 1330 h due to basking activity; a second peak in numbers occurs between 1500 and 1530 h (Fig. 3).

The specimens from the marsh zone typically have a very dark gray dorsum, with the bands becoming obscured with age, and a cream venter which becomes suffused posteriorly with increasing amounts of dark gray until the posterior one-third or one-half is solid gray.

Two specimens were found on the mainland which differ from this typical condition. The first was a gravid female with normal dorsal coloration but with a bright red-orange venter with no gray stippling. On 9-4-80 she bore 29 offspring, many of which had a light orange streak down the mid-venter but with white on the edges. The second was an intergrade between *sipedon* and *insularum* of the "C" phenotype (see Conant and Clay 1937 for phenotype descriptions) from the Marblehead Peninsula. This form occurs at low frequency on the Marblehead Peninsula (Conant and Clay 1937), and was not an unexpected find. On 9-8-80 it bore 16 offspring, all of which were banded. Intergradation between *sipedon* and *insularum* will be considered in more detail in the next species account.

On 5-16-81, four males courting a large female were observed at Willow Point WA. The female was *in copula* with one male while the others were engaged in dorsal chin-rubbing, dorsal forward-advancement, and tail-search copulatory attempts (Gillingham 1979). No aggression between the males was observed. Reproductive behavior of this type has been described for *N. s. insularum* (Langlois 1964) and for other natricine snakes (Aleksiuk and Gregory 1974). The above snakes were



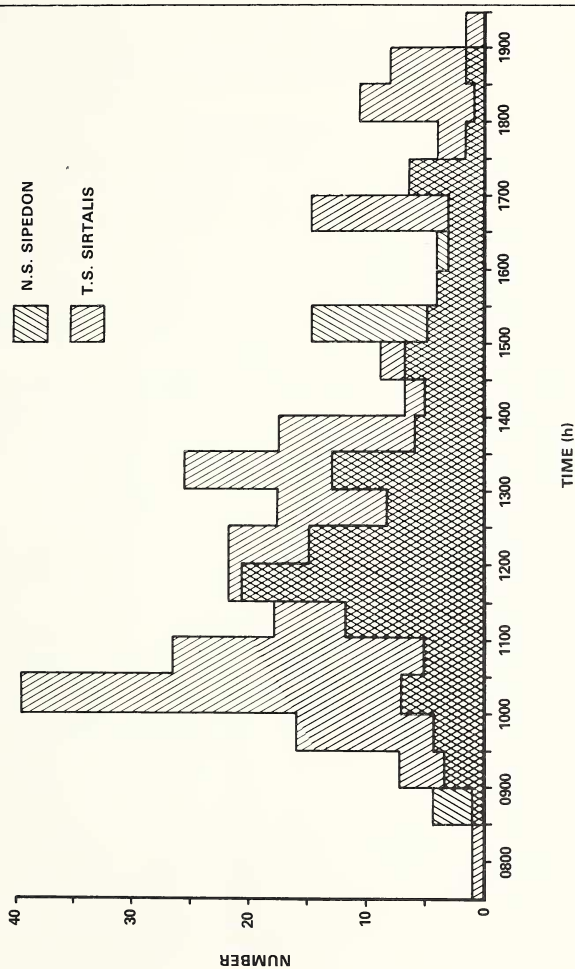


Fig. 3. Observation times of *Nerodia s. sipedon* and *Thamnophis s. sirtalis*.

found on tree branches two feet above the water ca. 6 ft from shore at 1530 h on a warm, sunny day.

Localities listed by Conant (1938a) are largely contained within or adjacent to our localities, except for Mouse Island, which we did not visit.

*Nerodia sipedon insularum* (Lake Erie Water Snake)

South Bass Island, 6-14-79 (4); Middle Bass Island, 6-24-79 (13), 7-30-80 (11), 7-28-80 (12), 7-29-80 (1); North Bass Island, 6-11-80 (10); Kelleys Island; East Harbor SP, 7-80 (1).

Rare

This subspecies is largely restricted to the Lake Erie Islands of Ohio and Ontario but occurs in very small numbers on the adjacent Catawba and Marblehead peninsulas of Ohio (Conant and Clay 1937). It is limited in habitat primarily to the rocky shorelines, but does occasionally inhabit more inland environs.

We consider "*insularum*" to include only those specimens lacking (or nearly lacking) dorsal and ventral patterns (designated as "A" by Conant and Clay, 1937) and not the phenotypes ("ab," "B," "bc," "C," "cd," and "D") exhibiting dorsal and ventral patterns (Conant and Clay 1937; Camin et al. 1954) (however, see Conant and Clay 1963, for an alternative opinion). Of the latter group, "D" designates typical *N. s. sipedon*; the remainder are intermediate phenotypes between *insularum* and *sipedon*.

With this understanding of what we consider to be pure *insularum*, only 14 specimens of this subspecies have been observed during these two years; however, somewhat larger numbers of the patterned phenotypes have been observed during the same period. Regardless of the taxonomic designations, the population densities of insular *Nerodia* have been drastically reduced over the past 40 years. Conant and Clay (1937) and Camin and Ehrlich (1958) reported collecting on a single island 234 and over 400 *Nerodia*, respectively, each within the span of a few hours in a single day. It is now doubtful whether these numbers of *Nerodia* could be found in an entire summer of intensive collecting on the islands.

The largest number collected by us on a single island were from Middle Bass Island. Of a total of 37 specimens collected, only 11 (30%) were identified as *insularum*, 18 (49%) were identified as intermediates, and 8 (21%) were indistinguishable from typical Ohio mainland *sipedon* from the marsh areas. Conant and Clay (1937) reported that of 51

*Nerodia* collected from Middle Bass Island, 27.5% were "A," 62.8% were "B" and "C," and 9.7% were "D."

On North Bass Island 10 specimens were collected: 2 (20%) were identified as *insularum*, 7 (70%) were identified as intermediates, and 1 (10%) was a *sipedon*.

On South Bass Island 4 specimens were collected; all were intermediates ("bc"-"C").

The Kelleys Island record is based on the observations of Richard King, who is presently studying the populations of this subspecies. We were unable to locate specimens on this island during our visits.

In East Harbor SP, a specimen of *insularum* (adult female) was collected by Doug Ceraldi and kindly given to us for study. Although this specimen lacked dorsal and ventral patterns, it was unusually dark for *insularum*. On 8-30-80, she bore 26 offspring, 2 of which were *insularum*; the remainder were patterned.

Reproductive activity was not observed by us but had been observed by Langlois (1964) in May. Hamilton (1951) observed female "*insularum*" to be first noticeably pregnant in May, and to range in size from 571 mm to 921 mm. The number of embryos per female ranged from 8 to 26, and a brood of 27 was observed. Parturition occurs in late summer and autumn.

We observed several neonate *Nerodia* on Middle Bass Island with ingested *Notropis* spp. Other reported food items include fish (*Percina*, cyprinids, *Cottus*) and amphibians (*Rana pipiens*, *R. clamitans*, *Bufo* spp., *Necturus*) (Hamilton 1951; Langlois 1964).

On the shoreline of South Bass Island, which is largely developed with houses, the preferred habitat of *Nerodia* is nearly eliminated, and we seriously doubt the island can once again support even a moderately sized population. After a search of most of the island, we located only one narrow stretch of shoreline of ca. 200 yd length which appeared potentially suitable for *Nerodia*. We collected only 4 water snakes and, due to the suboptimal conditions of the habitat, this area can likely support only few more.

Middle Bass Island, though presently supporting a moderately sized population of *Nerodia*, is in the process of becoming like South Bass Island. This is due to increased building and clearing activities along the shoreline and the increased influx of tourists on the island. Both factors are contributing to the degradation of the shoreline habitat that *Nerodia* inhabits.

On Kelleys Island we could not locate any suitable shoreline habitat; however, it was not possible to search the entire island in the short time available.

Only on North Bass Island did there appear to be extensive areas of shoreline suitable for *Nerodia*. Additionally, the snakes appeared to be relatively free of human harassment.

Because of the increasing lack of habitat for all *Nerodia* on the larger Ohio islands, the increasing harassment from tourists on some of the islands, and the increasingly greater proportion of *N. s. sipedon* and intermediates on the islands, we believe the status of *N. s. insularum* to be extremely precarious. We therefore highly recommend official protection of the subspecies by the state of Ohio. We feel it would be of additional benefit to this subspecies if agreements between the ODNR and the owners of the private islands (for example, Green, Rattlesnake, North Bass) were reached concerning the protection of all insular *Nerodia* on these islands. Moreover, a public education program for the residents of the other islands may be useful.

#### *Regina septemvittata* (Queen Snake)

Cedar Point NWR, 7-14-80 (1); Ottawa NWR, 6-20-80 (1); Crane Creek SP, 4-4-69 (1); Magee Marsh, 5-6-79 (1); Toussaint Shooting Club, 7-28-80 (1), 7-29-80 (2); Willow Point WA, 5-16-81 (3); Resthaven WA, 8-1-80 (2); Huron River, 8-5-80 (1); Kelleys Island. *Uncommon*

This species is no doubt more widespread in the marsh zone than our records indicate. It is often rather secretive and some of our specimens were found hiding under cover. Most, however, were seen basking on branches overhanging the water. Such specimens were usually gravid females.

The specimen from Kelleys Island was observed by Richard King in 1980 and is the first record of this species from any of the Lake Erie Islands.

Conant (1938a) records this species at Sandusky, Erie Co.; and Green Creek, Sandusky Co.

#### *Clonophis kirtlandi* (Kirtland's Snake)

Cedar Point NWR, 7-14-80 (1).

*Rare*

The above specimen was an adult male. We are also aware of one dead and three live specimens taken from the same locality in the past six years.

Conant (1938a) has recorded this species from Nile's Woods, Lucas Co.; 6 mi NE of Fremont, Sandusky Co.; and Sandusky, Erie Co. It has not yet been reliably recorded from the Lake Erie Islands.

*Thamnophis butleri* (Butler's Garter Snake)

Ottawa River, Toledo, 6-19-80 (10); Nile's Woods, 6-18-80 (1), 7-4-80 (2), 8-11-80 (1); Cedar Point NWR, 7-14-80 (3); Ottawa NWR, 6-2-80 (3), 6-24-80 (1), 5-29-81 (3); Crane Creek SP, 6-17-80 (1); Magee Marsh, 6-16-80 (2); Little Portage River WA, 7-18-80 (1), 5-16-81 (>10); Ottawa Shooting Club, 8-12-80 (1). *Uncommon*

This species is locally common in some parts of the marsh zone but is rare or absent in others. Although this species is usually less abundant than *T. s. sirtalis* when the two occur in the same locality, there are a few localities where *sirtalis*, an abundant snake in this region, is largely replaced by *butleri*.

The specimen from the Ottawa Shooting Club represents a new county record.

Conant (1938a) also records this species from Sandusky, Erie Co.; Port Clinton, Ottawa Co.; and Bono and Reno Beach, Lucas Co. This species has not yet been recorded from the Lake Erie Islands.

*Thamnophis sirtalis sirtalis* (Eastern Garter Snake-striped phase)

Ottawa River, Toledo, 6-5-81 (1); Nile's Woods, 6-18-80 (9), 7-4-80 (3), 7-21-80 (2); Cedar Point NWR, 6-23-80 (4), 6-30-80 (3), 7-9-80 (2), 7-14-80 (2); Metzger's Marsh, 5-19-80 (2), 6-18-80 (1); Ottawa NWR, 6-20-80 (24), 6-24-80 (12); Crane Creek SP, 6-17-80 (14); Magee Marsh, 6-16-80 (19), 6-18-80 (8); Toussaint Creek WA, (11), 8-13-80 (5), 5-16-81 (15); Navarre Marsh, 6-25-80 (10), 6-27-80 (4); Darby Marsh, 7-1-80 (5); East Harbor SP, 6-26-80 (3), 7-7-80 (7); Marblehead Quarries, 7-7-80 (1), 8-14-80 (3); Bay Point, Marblehead, 7-21-80 (1); Little Portage River WA, 8-1-80 (1), 8-11-80 (5), 5-16-81 (2); Winous Point, 7-25-80 (2), 8-21-80 (7); Ottawa Shooting Club, 8-4-80 (6), 8-12-80 (12); Willow Point WA, 7-30-80 (8), 5-16-81 (15); Bay View Marsh, 7-24-80 (3), 7-30-80 (1); Sheldon's Marsh, 7-15-80 (1), 8-22-80 (1); Huron River, 8-5-80 (1), 8-8-80 (6); Old Woman's Creek, 7-9-80 (16); High Bridge Rd., Lorain Co., 7-23-80 (2); South Bass Island, 6-14-79 (1); Middle Bass Island, 7-3-80 (15); North Bass Island, 7-11-80 (4); West Sister Island, 5-13-81 (13). *Abundant*

This was the most common species of reptile in the coastal zone. It was found in all major habitats, but it attained its highest densities in grassy marsh or field areas.

As can be seen from Figure 3, *T. s. sirtalis* was most active between 0930 h and 1400 h (71% of sightings) with less activity apparent at other times of the day and a smaller peak between 1630 h and 1900 h (15% of sightings). Its peak activity takes place earlier than *N. s. sipedon*, the other dominant natricine member of the marsh zone herpetofauna.

The most important food for this species in the marsh zone is frogs and fish; several specimens of *T. sirtalis* were located during the survey in the process of devouring the former (see remarks under *Rana pipiens*). On 5-16-81, one individual of this species was found with a piece of a *Microtis* carcass in its mouth. Upon capture, examination revealed another partial *Microtis* in its stomach.

Due to the ubiquitous presence of this species in the coastal zone, there is little point in including localities mentioned by other authors.

*Thamnophis sirtalis sirtalis* (Eastern Garter Snake—melanistic phase)

Wildwood Metropark, 4-17-80 (1); Medical College of Ohio, 6-18-75 (1); Nile's Woods, 6-18-80 (2), 7-4-80 (1), 7-21-80 (1); Cedar Point NWR, 6-30-80 (1), 7-9-80 (3), 7-14-80 (1); Ottawa NWR, 6-20-80 (2), 6-24-80 (1); Crane Creek SP, 6-17-80 (1); Magee Marsh, 6-16-80 (3); Toussaint Creek WA, 6-15-81 (2); Navarre Marsh, 6-25-80 (5), 6-27-80 (1); Camp Perry, 4-26-81 (1); Darby Marsh, 7-1-80 (4); East Harbor SP; Little Portage River WA, 5-16-81 (2); Winous Point, 7-25-80 (1), 8-21-80 (2), 6-6-81 (1); Ottawa Shooting Club, 8-4-80 (2), 8-12-80 (3), 6-6-81 (1); Willow Point WA, 5-16-81 (1); Sheldon's Marsh, 8-2-80 (1); Old Woman's Creek; Kelleys Island, 8-19-80 (1); Middle Bass Island, 7-3-80 (2), 5-30-81 (4); West Sister Island, 5-13-81 (2).

Rare

These snakes are a recessive color phase of the widespread *T. s. sirtalis* and are restricted in Ohio to the marsh zone of western Lake Erie and its immediate environs. The Mendelian inheritance pattern was established by Blanchard and Blanchard (1941). Where found, this phase occurs at low to moderate densities.

Because the range of this color morph in Ohio has not previously been precisely ascertained, we include all localities for the form known to us, both within and out of the coastal zone (Fig. 4). It is apparent, however, that this phenotype is mainly restricted to the marsh zone and

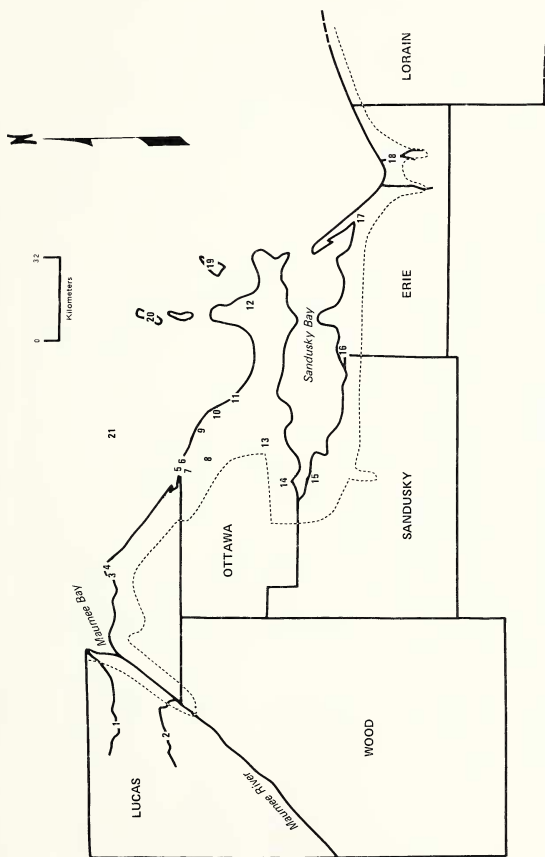


Fig. 4. Collecting sites for melanistic *Thamnophis s. sirtalis*. 1—Wildwood Metropark; 2—Medical College of Ohio; 3—Nile's Woods; 4—Cedar Point NWR; 5—Crane Creek SP; 6—Magee Marsh; 7—Ottawa NWR; 8—Toussaint Creek WA; 9—Navarre Marsh; 10—Camp Perry; 11—Darby Sister Island; 12—East Harbor SP; 13—Little Portage River WA; 14—Winous Point; 15—Ottawa Shooting Club; 16—Willow Point WA; 17—Sheldon's Marsh; 18—Old Woman's Creek; 19—Kelley's Island; 20—Middle Bass Island; 21—West Sister Island.

extends little beyond its boundaries. Conant (1938a, 1951) listed only five localities for melanistic *T. sirtalis*, of which we have not been able to verify one of these at the present. To this we have added 17 new localities, of which the Ottawa Shooting Club locality is a new county record.

We are confident that the vast majority of this form's range in Ohio is encompassed within the boundaries of our data points. The populations at localities 1 and 2 may be due to accidental release of individuals from captivity. In east Erie Co., the habitat utilized by this form effectively terminates near the Lorain Co. boundary; hence, Old Woman's Creek is likely the eastern boundary of this phase. In fact, the phenotype is rare in Erie Co. as a whole, all localities there being represented by only a single specimen.

It may be concluded from our data that the melanistic phase of *T. s. sirtalis* has its center of abundance in Ohio in the marshes extending between Cedar Point NWR and Sandusky Bay. South of Sandusky Bay melanistics are much less common (except at Ottawa Shooting Club near the head of the bay) and seem not to exist east of the Old Woman's Creek area. West of Cedar Point NWR a couple of localities exist within Toledo.

The specimen from Old Woman's Creek was not found by us but by manager Gene Wright, and is the only individual of this form to have been observed by him in the area. Similarly, the specimens observed by us from East Harbor SP and Camp Perry were captured by Doug Ceraldi and Barry Muller, respectively.

For the admittedly limited data we have available, our records indicate a sex ratio of 2 males to 3 females for all areas in the marsh zone combined. Our records also indicate a uniform distribution of size classes (classes beginning at 6 in. and increasing in 6-in. intervals) to a size greater than 24 in., after which fewer individuals occur.

Our observations indicate that melanistic *T. sirtalis* are most active between 1000 h and 1400 h during which 68% of our specimens were sighted (65% of striped-phase individuals were found during this time period). During the time of the second peak of activity in striped-phase *sirtalis* (1630 h to 1900 h, 15% of the observations), we recorded 17% of our melanistic individuals, although not enough data are available to indicate an obvious secondary peak. These comparisons indicate no difference in daily activity patterns between the two phenotypes ( $X^2 = .205$ ,  $df = 1$ ).



It should be noted that our few populational data allow for only the most crude of conclusions and serve only as rough guidelines until more complete studies are conducted.

Over the past several years many of this form's larger populations in Ohio have been decimated by collecting for the pet trade. This snake is a novelty in such areas as Europe and California, and collecting of large numbers of these snakes for shipment to such places is common. Officially protected lands such as the national wildlife refuge units and state-owned wildlife areas have not been spared from these activities and are, instead, often the focus of attention by collectors. This problem of collecting is further exacerbated by the fact that the melanistic phenotype is a recessive character. Yet, official protection of this restricted form has been lacking, due perhaps, in part, to its lack of distinct taxonomic status. Because it is locally endemic, has a recessive color pattern, and has potential utility in the study of certain evolutionary questions, we highly recommend that the melanistic phase of *T. s. sirtalis* be given protection by the state of Ohio from commercial sale and collection.

*Storeria dekayi* (Brown Snake)

Ottawa River, Toledo, 6-19-80 (2); Cedar Point NWR, 6-3-80 (1), 7-9-80 (1), 7-14-80 (7); Crane Creek SP, 4-4-69 (3), 4-27-69 (2), 5-2-69 (2); Magee Marsh, 5-6-79 (1); Navarre Marsh, 6-25-80 (1), 6-27-80 (2); Bay View Marsh, 7-24-80 (5); Old Woman's Creek, 7-9-80 (3); Kelleys Island; South Bass Island; Middle Bass Island, 7-3-80 (8), 7-25-80 (20); North Bass Island, 7-11-80 (2).

*Uncommon*

This species was most abundant in field situations and was most easily found where there was cover under which to look. Both of these factors may account for its rather spotty distribution in the coastal zone. This is one reptile which, within the coastal zone, may be frequently found in woods.

The Kelleys Island and South Bass Island localities are based on the observations of Richard King in 1980.

This species has also been reported from Cedar Point, Castalia, Sandusky, and Huron, Erie Co.; and Port Clinton, Catawba Peninsula, Marblehead Peninsula, and Rattlesnake Island, Ottawa Co. (Conant 1938a) and Gibraltar Island (Langlois 1964).

*Diadophis punctatus edwardsi* (Northern Ringneck Snake)

South Bass Island

Rare

This species was seen on South Bass Island by Richard King during the summer of 1980.

Also recorded by Conant (1938a) from near Port Clinton and the Catawba and Marblehead Peninsulas.

*Heterodon platyrhinos* (Eastern Hognose Snake)

Kelleys Island, 7-23-81 (1).

Rare

A melanistic DOR specimen was found near the quarry on the south side of the island.

It has been reported by Conant (1938a, 1965) from Cedar Point, Kelleys Island, and Sandusky, Erie Co.; and Marblehead Peninsula and South Bass Island, Ottawa Co.

*Coluber constrictor flaviventris* (Eastern Yellowbelly Racer)

Marblehead Quarries, 8-14-80 (1); Huron River, 8-8-80 (1); South Bass Island; Middle Bass Island, 5-30-81 (1), Kelleys Island.

Rare

This species is rare in the coastal zone because of its preference for drier, more upland habitats than exist in most of this region. All of our specimens were found in dry, open conditions without nearby wetlands.

The South Bass and Kelleys Island records are based on the observations of Richard King in 1980.

The species has been recorded previously from Cedar Point, Erie Co.; Catawba, Ottawa Co.; and Cedar Point NWR, Lucas Co. by Conant (1938a).

*Elaphe vulpina gloydi* (Eastern Fox Snake)

Ottawa River, Toledo, 6-19-80 (3); Nile's Woods, 6-18-80 (1); Cedar Point NWR, 6-23-80 (1), 6-30-80 (1), 7-9-80 (8), 7-14-80 (2); Metzger's Marsh, 5-19-81 (1); Ottawa NWR, 6-20-80 (12), 6-24-80 (6), 5-29-81 (8); Crane Creek SP, 6-17-80 (9); Magee Marsh, 6-16-80 (1), 6-18-80 (2); Toussaint Creek WA, 6-27-80 (4), 6-30-80 (5); Toussaint Shooting Club, 7-29-80 (5), 8-3-80 (1); Darby Marsh, 7-1-80 (5); East Harbor SP, 6-26-80 (2), 7-7-80 (2); Marblehead Quarries, (1); Little Portage River WA, 5-27-77 (1), 5-16-80 (2); Winous Point, 7-25-80 (2); Troy Twp., Wood Co., 8-73 (1); Elmore, Ottawa Co., 8-73 (1); Ottawa Shooting Club, 6-6-81 (2); 3 mi E of Green Springs, Seneca Co., 8-30-69 (2), 9-27-69 (2); Willow Point WA, 5-16-81 (3); Castalia, 6-6-81

(1); Bay View Marsh, 7-30-80 (2); Old Woman's Creek, 7-9-80 (2); Kelleys Island, 7-23-81 (2); South Bass Island, 6-14-79 (1); Middle Bass Island, 6-8-80 (1), 7-3-80 (1); North Bass Island, 7-11-80 (2); West Sister Island.

*Common*

This species is restricted in Ohio largely to the marsh zone but extends outside of this in the southwest portion of its range. The Old Woman's Creek records extend the known range of this species 6 mi to the east. It probably does not range east much beyond this locality due to the termination of its preferred habitat. Collecting to the east of Old Woman's Creek has failed to yield *E. vulpina*. The locality east of Green Springs, Seneca Co., represents a range extension of 10 mi to the south and a new county record.

The Marblehead locality is based on the observations of Doug Ceraldi, while the West Sister Island locality was recorded by Richard King. All were observed in 1980.

Our data indicate an overall sex ratio of 2 males to 1 female. When juveniles are excluded and the sex ratio examined for each month for which there are adequate data, a slight increase in the proportion of males occurred between May and June, which was maintained through July. This may reflect the less mobile habits of gravid females during this time. Unfortunately, data are unavailable on the sex ratio at birth, so it is unknown if the sex ratio of 2 to 1 was actual or reflects the more sedentary habits of females.

The smallest gravid female collected was 95 mm. This provides an estimate of 36 in. as the size at which sexual maturity can be attained in this species; however, males may achieve sexual maturity before this size is reached (Fitch, 1970). As such, 73% of our specimens were reproductively mature. While this seems to indicate that many of the populations we sampled are reproductively stable, it does not represent an accurate age-class structure for the populations due to the difficulty of locating neonates and juveniles. In only one population were we able to obtain sufficient numbers of neonates and juveniles, and this was due to the fact that artificial cover was available at this locality. This indicates that the neonates and juveniles remain secretive until around the time of reproductive maturity. Conditions of dense vegetation and scarce cover at many of the localities make locating neonates and juveniles very difficult.

There is some indication of a slight sexual size dimorphism, with a greater proportion of males than females larger than 48 in. (one male was over 60 in.), while more of the females occurred in the size class

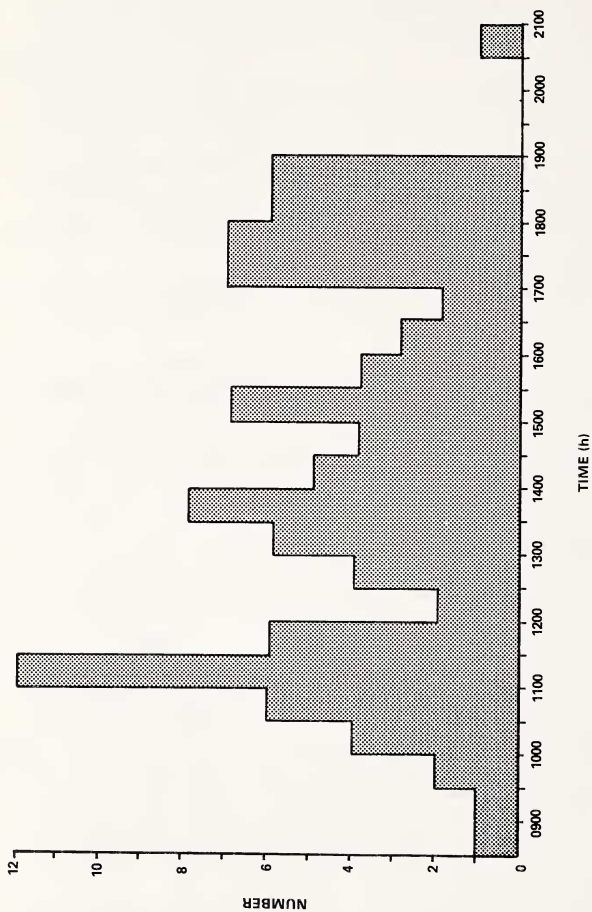


Fig. 5. Observation times of *Elaphe vulpina gloydi*.

37 to 48 in. This size dimorphism (males larger) may indicate that this taxon engages in male-male combat (Shine 1978; see also Gillingham 1980).

Our records indicate that *E. vulpina* was active throughout the day without a noticeable peak of activity (Fig. 5). However, seasonal variation in abundance does occur. This species is most commonly seen from May through June. During July its activity decreases, and in August it is very difficult to find. During August 1980 we saw only two specimens, whereas more than 50 had been seen in the last two weeks of June and 30 in July. This reduction in numbers seen as the summer progresses is similar to that observed by Conant (1938b).

While the fox snake seems to be common in much of its range, it is potentially threatened by capture for commercial sale in much the same way as the melanistic *T. s. sirtalis* discussed previously. Therefore, we support a ban on commercial collecting and sale of this species in Ohio.

Conant (1938a, 1965) lists several other localities for the fox snake in Lucas, Wood, Ottawa, Sandusky, and Erie Cos.

#### Discussion

In the course of this survey, 28 herpetofaunal species were collected, of which we consider 11 species to form a characteristic marshland assemblage. They are as follows:

- Rana catesbeiana*
- R. clamitans melanota*
- R. pipiens*
- Chelydra s. serpentina*
- Emydoidea blandingi*
- Chrysemys picta marginata*
- Nerodia s. sipedon*
- Regina septemvittata*
- Thamnophis butleri*
- T. s. sirtalis*
- Elaphe v. gloydi*

This category is composed of species which are either common in the marsh zone (e.g., *Chrysemys*), are far less common in other habitats in NW Ohio (e.g., *Regina*), or may appear to be uncommon as an artifact of difficulty of observation yet have an extensive range within the marsh zone (e.g.,

*Chelydra*). The remaining 17 species surveyed are either rare in the marsh zone or prefer non-marsh habitats, such as fields or upland woods, which are of limited distribution in the study area.

Of the 11 species (one with two distinct color phases) considered by us to be characteristic of the marsh zone habitat, 8 are of widespread occurrence in the eastern United States, 2 have their distributions lying largely to the west, one is of restricted occurrence in the midwest, and the melanistic phase of *T. s. sirtalis* is endemic in the marsh zone. Due to the location of the study site, the occurrence of a largely eastern herpetofauna is to be expected. The two western elements (*E. blandingi* and *E. v. gloydii*) and the midwestern form (*T. butleri*) have been hypothesized as extending their ranges to the east with the extension of the Prairie Peninsula during the Xerothermic Interval (Schmidt 1938; see Conant 1978, for an overview). No explanation, to our knowledge, has been offered to account for the persistence of the melanistic phase of *T. s. sirtalis* in the marsh zone, or why it has not increased its geographical distribution. The apparent restriction of this color morph within the marsh zone suggests a high selective pressure favoring the melanistic phenotypes in the marsh zone, or a low-level gene flow across the ecotone (Endler 1977). Because of the ability of *T. s. sirtalis* to establish itself successfully in numerous different habitats, we consider the latter explanation less likely. We have observed that captive neonatal and juvenile melanistic *T. sirtalis* have a marked feeding preference for fish (*Notropis. Poecilia*) and newly metamorphosed anurans (*Bufo americanus*); interestingly, they typically refuse to feed on suitably sized sympatric annelids (*Lumbricus*). Captive adult specimens, however, will readily accept *Lumbricus* as well as fish and anurans. Arnold (1981a,b) has demonstrated a clear example of geographic variation in feeding behavior with a genetic basis in *Thamnophis elegans*. Thus, the restricted distribution of melanistic *T. sirtalis* may be due to food preferences of the young; we emphasize, however, that this speculation is based on our few casual observations of captive specimens.

In addition to the species recorded by us in the coastal zone, 12 other species have been previously recorded by Walker (1946), Conant (1938a, 1951), and Langlois (1964). These are:

*Necturus m. maculosus*

*Hyla c. crucifer*

*Pseudacris t. triseriata*

*Sternotherus odoratus*

*Terrapene c. carolina*

*Clemmys guttata*

*Thamnophis sauritus septentrionalis*

*Opheodrys v. vernalis*

*Elaphe o. obsoleta*

*Lampropeltis t. triangulum*

*Sistrurus c. catenatus*

*Crotalus horridus*

Moreover, Dr. Bob Meeks has seen and collected *S. c. catenatus* (osum 1324) at Winous Point on both north and south sides of Sandusky Bay, although the populations appear to have been extirpated within the past ten years.

Most of the above species are very rare within the coastal zone and most were not found within marsh habitat. The few specimens previously recorded for most of these species are from populations that were probably small and have likely been subsequently extirpated. The amphibian species, however, may be more common but remained unnoticed due to the short temporal span of the study.

As noted by Conant (1938b), we have observed that herpetofaunal activity in the marsh zone decreased as the summer progressed. This was especially notable for the snakes, and was previously mentioned in the fox snake account. This decrease in activity is probably due to higher temperatures and/or drier conditions which prevail during July and August. Hence, certain species may have appeared rarer in the coastal zone than they actually were because the survey was largely conducted in these two months. Similarly, areas surveyed only during this period may have appeared faunistically more depauperate than they actually were.

No similar decrease in amphibian activity was evident, due, in large part, to the fact that summer presents nonoptimal conditions for most species, thereby not allowing for much of a decrease in activity beyond the low level observed. *Rana pipiens* is an exception in that we observed increased activity as the summer progressed.

Juveniles of most of the reptile taxa were rarely observed. We consider this due to their less conspicuous size and more secretive habits, the relative importance of which varies for each species. For this reason, sufficient data for size class comparisons could not be obtained, and recruitment rate for any of the populations is unknown. The only species for which juveniles were readily found was the secretive *Storeria dekayi*, for which the sampling method does not bias the observation of any age-class.

Due to the accelerated alteration of the marsh zone by man in the past several decades, we believe the data presented by Conant (1938a, 1951) and Walker (1946) to be of questionable present utility. For this reason, the primary goal of this report is to provide information on the present-day

geographical distribution and status of the populations of amphibians and reptiles within the coastal zone. We have elucidated what we consider to be the characteristic herpetofauna of the marsh zone; other herpetofaunal elements present within this area are of much lesser abundance and/or restricted geographical range. The Lake Erie Islands, albeit included in the coastal zone, have a quite distinct environment from the mainland marsh habitat, and their herpetofauna is not necessarily characterized by the 11 species listed above.

Although large tracts of habitat are protected within the marsh zone, we consider three forms (*E. v. gloydi*, *T. s. sirtalis*-melanistic, and *N. s. insularum*), all endemic to the study site and adjacent similar areas in Michigan and/or Ontario, Canada, in need of yet further protection to ensure their continuance in the marsh zone herpetofauna in Ohio.

Because several of the species herein considered are common to abundant in the marsh zone, because large tracts of land are protected, and because several ecological and evolutionary questions are amenable to testing in the area, we highly recommend this site for future herpetological research.

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#### Addendum

1) *Pseudacris triseriata triseriata* (Western Chorus Frog)

Ottawa NWR, 4-17-82.

*Rare*

Several individuals were heard calling in flooded woods. This species is probably widespread in the coastal zone but was unnoticed by us because of its concentration of activity in early spring.

This species has been recorded on Kelleys Island (Hirschfeld and Collins 1961).

2) Nile's Woods is now included in the eastern section of the newly formed Maumee Bay SP.